

II. Listing of Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1 – 31 (Cancelled)

Please add the following new claims:

32. (New) An automatic separator/extractor comprising;
conveying means for moving along a closed path and for receiving at least one vessel;
a dispenser for dispensing a reagent, or the like, into the vessel as it moves along the path;
at least one nozzle adapted for insertion into the vessel;
means for effecting relative vertical movement between the nozzle and the vessel in order to insert the nozzle into the vessel; and
a mechanism for inclining the nozzle and vessel with respect to a vertical axis to pass liquid, other than a precipitate, from the vessel and into the nozzle.
33. (New) An automatic separator/extractor according to claim 32 further comprising a separator for separating the contents of the vessel.
34. (New) An automatic separator/extractor according to claim 33 wherein the separator is mounted on the conveying means.
35. (New) An automatic separator/extractor according to claim 33 wherein the separator is mounted on a vessel installed away from the conveying means.
36. (New) An automatic separator/extractor according to claim 33, wherein the separator exerts a centrifugal force or a magnetic force to perform the separation.

37. (New) An automatic separator/extractor according to claim 33 further comprising means for moving the vessel relative to the conveying means.

38. (New) An automatic separator/extractor according to claim 37 further comprising an operation/control unit for operating and controlling the conveying means, the moving means, and the separator.

39. (New) An automatic separator/extractor according to claim 38 further comprising a vibration unit controlled by the operation/control unit for vibrating the vessel to agitate the contents of the vessel.

40. (New) An automatic separator/extractor according to claim 32, wherein the vessel is a microplate provided with a plurality of wells, and wherein the conveying means receives and conveys a plurality of the microplates.

41. (New) An automatic separator/extractor according to claim 38 wherein the conveying means comprises:

a turntable;

a plurality of mounting units for mounting a plurality of vessels on the turntable so as to subtend therebetween equally divided base central angles; and

a rotation drive unit for repeatedly rotating and stopping at units of the base central angle in accordance with instructions from the operation/control unit.

42. (New) An automatic separator/extractor according to claim 38, wherein a conveying speed, a conveying direction, a stop interval, a conveying interval, a conveying distance and/or a mounting position for the vessel are set by the operating/control unit based on the contents or purpose of a specified process.

43. (New) An automatic separator/extractor according to claim 41, wherein the separator comprises a centrifuge provided adjacent the inside or the outside of the turntable.

44. (New) An automatic separator/extractor according to claim 43, wherein a rotation speed of the centrifuge, a rotation time and a location of a vessel are set by the operation/control unit based on a liquid contained in the vessel, the nature or weight of a precipitate or a target substance, and/or the contents or purpose of a process.

45. (New) An automatic separator/extractor according to claim 32, wherein the dispenser comprises means for moving the nozzle between the vessel and a reagent tank spaced from the conveying means.

46. (New) An automatic separator/extractor according to claim 45 further comprising an operation control unit for setting the speed of the extraction, a timing or sequence of the extraction, the presence of insertion or removal of the nozzle, or the timing thereof.

47. (New) An automatic separator/extractor according to claim 32 further comprising a tank provided in the dispenser for containing a reagent, a sensor for detecting the reagent level in the tank, and means for supplying the reagent to the tank in response to the sensor.

48. (New) An automatic separator/extractor according to claim 32, further comprising a magnetic device having poles positioned outside a bottom or side wall of the vessel.

49. (New) An automatic separator/extractor according to claim 32, further comprising a mechanism for adjusting the relative position between the nozzle and inner walls of the vessel in order to contact the tips of the nozzle against the inner walls of the vessel.

50. (New) An automatic separator/extractor according to claim 49, wherein the position adjustment mechanism comprises;

a cylindrical support unit for supporting a plurality of nozzles arranged along a horizontal cylindrical axis and passing through opposite cylindrical side faces to protrude downwards, so as to be rotatable about the cylindrical axis,

a flexible tube for communicating between an upper end of each of the nozzle and the liquid extraction device, and

a mechanism for rotating the cylindrical support unit and/or sliding the cylindrical support unit in a horizontal direction.

51. (New) An automatic separator/extractor according to claim 32, further comprising an operation/control unit for setting the incline angle, the incline speed, the incline timing, the movement direction and amount, the extraction speed and/or the extraction timing, based on the purpose of an indicated process, and/or the shape or size of the nozzle and/or vessel.

52. (New) An automatic separator/extractor according to claim 32, further comprising a liquid extraction device for extracting liquid other than a precipitate from the vessel, the extraction device and the nozzle adapted to draw liquid from the vessel and discharge it to another vessel mounted on the conveying means.

53. (New) An automatic separator/extractor according to claim 52, further comprising an integration apparatus comprising:

a main body provided with a plurality of cylinders corresponding to a plurality of wells provided in the vessel, and

a plunger unit provided with a plurality of push plungers which protrude so as to be insertable into each of the cylinders,

the nozzle being provided beneath the cylinders for communicating with the cylinders, and a plurality of pipette tips detachably fitted to the nozzle.

54. (New) An automatic separator/extractor according to claim 53, further comprising means for moving the integration apparatus between a vessel mounted on the conveying means and another vessel; or between the vessel and a washing unit for the pipette tips.

55. (New) An automatic separator/extractor according to claim 54, wherein the integration apparatus comprises a link mechanism to attach or remove the tips to or from the nozzle unit.

56. (New) An automatic separator/extractor according to claim 55, further comprising an operation/control unit for setting the extraction speed and timing, an insertion depth of a pipette tip in the vessel, or the type of pipette tip to be used based on the purpose of a process, the nature or amount of liquid, a precipitate, and/or the shape or size of the vessel.

57. (New) An automatic separator/extractor according to claim 32, further comprising a plurality of mounting units having a plurality of through bores for mounting the vessel on the conveying means.

58. (New) An automatic separator/extractor according to claim 57 further comprising a vibration pin extending through a through bore from the bottom side of each mounting unit and above the vessel at a secured position on the path, the pin being adapted to be vibrated.

59. (New) An automatic separator/extractor according to claim 58 further comprising a holding unit mounted above the vessel at the secured position for pushing and holding the vessel which has been pushed upwardly by advancing the vibration pin.

60. (New) An automatic separator/extractor according to claim 39, wherein the vibration unit comprises a frame extending above the vessel for contacting the vessel only at a rim on an upper face of the vessel, and wherein the nozzle can be inserted from above the frame into the vessel.

61. (New) An automatic separator/extractor according to claim 60, wherein the vibration strength, vibration period pattern, vibration time and timing due to the vibration

unit are set by the operation/control unit based on the nature or amount of liquid contained in a vessel, the shape or size of a vessel, and/or the purpose of a process.

62. (New) An automatic separator/extractor according to claim 32, further comprising an operation/control unit for setting movement origin and movement destination, movement timing, or movement speed of the vessel based on the purpose of a process, or the amount of liquid contained in a vessel.

63. (New) A liquid processing apparatus comprising:
a liquid extraction device;
a microplate having a plurality of wells;
a plurality of nozzles communicating with the liquid extraction device and insertable into the wells;
a movement mechanism for effecting relative movement between the nozzles and the microplate to insert the nozzles into the wells of the microplate; and
an incline mechanism for inclining the nozzle and microplate with respect to a vertical axis so that a liquid, other than a precipitate, is drawn in the nozzle or is discharged from an opening in the microplate.

64. (New) A method comprising;
conveying a vessel along a closed path;
dispensing a reagent, or the like, into the vessel as it moves along the path;
effecting relative vertical movement between the nozzle and the vessel to insert the nozzle into the vessel; and
inclining the nozzle and vessel with respect to a vertical axis to extract liquid, other than a precipitate, from the vessel and into the nozzle.

65. (New) A method according to claim 64 further comprising separating the contents of the vessel.

66. (New) A method according to claim 64, further comprising separating the contents of the vessel by exerting a centrifugal force or a magnetic force.
67. (New) A method according to claim 64 further moving the vessel relative to the conveying means.
68. (New) A method according to claim 64, further comprising vibrating the vessel to agitate the contents of the vessel.
69. (New) A method according to claim 64, further comprising mounting a plurality of vessels on the turntable so as to subtend therebetween equally divided base central angles; and repeatedly rotating and stopping at units of the base central angle in accordance with instructions from an operation/control unit.
70. (New) A method according to claim 69, further comprising setting a conveying speed, a conveying direction, a stop interval, a conveying interval, a conveying distance and/or a mounting position for the vessel based on the purpose of a specified process.
71. (New) A method according to claim 65 wherein the step of separating is done by a rotating separator and further comprising setting a rotation speed of the separator, a rotation time and a location of a vessel based on a liquid contained in the vessel, the nature or weight of a precipitate or a target substance, and/or the purpose of a process.
72. (New) A method according to claim 64, further comprising moving the nozzle between the vessel and a reagent tank spaced from the conveying means.
73. (New) A method according to claim 64, further comprising setting the speed of the extraction; a timing or sequence of the extraction; the presence of insertion or removal of the nozzle, or the timing thereof, based on the contents of the indicated process.

74. (New) A method according to claim 64, further comprising adjusting the relative position between the nozzle and the inner walls of the vessel in order to contact the tips of the nozzle against the inner walls of the vessel.

75. (New) A method according to claim 64, further comprising supporting a plurality of nozzles arranged along a horizontal cylindrical axis direction thereof and passing through opposite cylindrical side faces to protrude downwards, so as to be rotatable about the cylindrical axis.

76. (New) A method according to claim 64, further comprising setting the incline angle, the incline speed, the incline timing, the movement direction and amount, and the extraction speed and/or the extraction timing, based on the purpose of an indicated process, and/or the shape or size of the nozzle or vessel.

77. (New) A method according to claim 64 further comprising washing the nozzle.

78. (New) A method according to claim 64, further comprising setting the extraction speed and timing, an insertion depth of a nozzle in the vessel based on the contents or purpose of a process, the nature or amount of liquid, a precipitate, or target substance, and/or the shape or size of the vessel.

79. (New) A method according to claim 64 further comprising vibrating the vessel to agitate the contents of the vessel.

80. (New) A method according to claim 79, further comprising setting the degree of vibration, the vibration period pattern, vibration time and timing based on the nature or amount of liquid contained in a vessel, the shape or size of a vessel, and/or the purpose of a process.

81. (New) A method according to claim 64 further comprising moving the vessel between the path and an incubator.

82. (New) A method according to claim 64 further comprising setting the movement origin and movement destination, movement timing, or movement speed of the vessel based on the purpose of a process, or a liquid amount contained in a vessel.